REMARKS

Claims 25-44 are now pending in the application and stand rejected. The Examiner is respectfully requested to reconsider and withdraw the rejections in view of the amendments and remarks contained herein.

REJECTION UNDER 35 U.S.C. § 112

Claims 25-32 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. This rejection is respectfully traversed.

Claim 25 is directed to an "...apparatus comprising a processor and memory configured to..." *etc.* The remaining recitations of claim 25 make it clear that it is the apparatus itself that is being claimed. Claim 25 does not recite a method of using the apparatus. Applicants submit that claim 25, and claims 26-32 dependent on claim 25, are sufficiently definite. Accordingly, Applicants respectfully request that the rejection under 35 U.S.C. § 112, second paragraph be withdrawn.

REJECTION UNDER 35 U.S.C. § 101

Claims 25-32 stand rejected under 35 U.S.C. § 101 as being directed to neither a "process" nor a "machine." This rejection is respectfully traversed. As previously discussed, claim 25 is directed to an apparatus comprising a processor and memory. Claim 25 does not overlap two different statutory classes. An apparatus that generates a signal is a machine; In re Nuijten, 84 USPQ2d 1495, 1502 (Fed. Cir. 2007). Further, there is nothing inherently wrong with defining some part of an invention in functional terms. Functional language does not, in and of itself, render a claim improper. MPEP §

2173.05(g); In re Swinehart, 439 F. 2d 210, 169 USPQ 226 (CCPA 1971). Accordingly, Applicants respectfully request that the rejection under 35 U.S.C. § 101 be withdrawn.

REJECTION UNDER 35 U.S.C. § 103

Claims 25-44 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Pat. No. 6,748,304 to Felke et al. (hereinafter "Felke") in view of U.S. Pat. No. 6,725,184 to Gadh et al. (hereinafter "Gadh") and in further view of Water Pump Replacement Info, http://www.abnormal.com/~thogard/vw/h2opump.html (hereafter "Thogard"). This rejection is respectfully traversed.

The apparatus of Felke is used to improve fault isolation for failure modes (abstract). The apparatus of Felke is dependent on a fault model while Gadh describes a geometric model (e.g., a CAD model). Both models are clearly different from each other and also different from the cost model described in the specification. For example, Gadh describes "precedence relations" in the context of geometric components (col. 2, lines 38-62). Applicant submits that "precedence relations" would have very different meanings in a fault model such as Felke's, where the effects of failure are related to failures. It would not be obvious to incorporate geometrical model-dependent aspects of Gadh into the model of Felke.

Further, It is admitted in the Office Action that "Felke et al. does not expressly disclose, *determine whether the selected operation is a duplicate of another operation performable in the first process and/or performable in a second of the processes; and based on the determination, notify the user as to a possible reduction of costs by elimination of a duplicate performance of the selected operation.*" Gadh, however, does not teach or suggest the foregoing recitation. Gadh describes a method of analyzing a

geometric model (*e.g.,* a CAD model) based on *spatial* reasoning to determine an optimal non-interfering sequence to disassemble/assemble the modeled components (abstract). Although an "optimal" sequence might be defined as one with a minimal number of disassembly steps, minimal cost and/or minimal disassembly time (col. 16, lines 21-29), Gadh apparently uses the same geometrically-based methods to obtain the disassembly sequences, however defined (col. 22, lines 53-62). It seems evident that in Gadh there is no teaching or suggestion of "duplicate" operations. Therefore Gadh cannot teach or suggest eliminating performance of duplicate operations. In the method of Gadh, components that can be removed independently of each other are simultaneously disassembled. The objective is to use simultaneous removals in place of sequential removals wherever possible, and then minimize the number of simultaneous removals for selective disassembly of components, to minimize disassembly operations (col. 9, lines 1-15). The sequence with the least number of disassembly steps is an optimal sequence (col. 16, lines 20-23).

Simultaneously removing two components from a given structure, however, does not mean that one of the component removals *duplicates* the other. Further, simultaneous removal of two components in one step does not mean that one of the removal operations is eliminated. Two assembly/disassembly sequences described by Gadh for the same structure can have the same number of component removal *operations* but different numbers of removal *steps*. It also would be inaccurate to refer to two steps (which could be reduced to one step through simultaneous performance) as duplicates of each other, since they each would involve removal of a different component.

Further, even assuming (for the sake of argument only) that Gadh teaches or suggests eliminating duplicate operations, Applicant respectfully submits that there is no motivation to modify the apparatus of Felke by incorporating a method of eliminating "un-needed duplicate steps in a maintenance or repair procedure" as asserted in the Office Action. Felke discloses a method and apparatus for improving fault isolation. The apparatus of Felke identifies a set of repairs associated with a fault code. The repairs are linked to the fault code in a fault model and are derived from existing maintenance procedures for the fault code (col. 7, lines 5-22). The set of repairs may be narrowed down to a single repair, based on testing consistent with the failure mode (FIG. 3). There would be no reason to determine whether duplicate steps are present among *alternative* repairs under consideration *to isolate the fault*, *i.e.*, where tests are run to preclude at least some of the repairs and where only one of the repairs ultimately is determined as effective to fix the fault (col. 10, lines 59-64).

Further, when a set of possible repairs includes more than one component, the repairs are ranked in a sequence that will minimize an *average* cost to repair the aircraft (col. 3, lines 23-25; col. 10, line 28-col. 12, line 10). The apparatus and method of Felke are used to reduce *overall or average costs* to repair a complex system. Accordingly, the apparatus of Felke may select a repair sequence that has a higher individual cost than another repair sequence (col. 10, lines 28-68). To modify the algorithm of Felke to adjust a cost for a duplicate step in a given repair procedure would change the principle of operation of the apparatus of Felke, *i.e.*, that costs are to be saved on an average basis, even where costs might not be saved at the level of the individual repair. In the algorithm of Felke, an optimal removal sequence depends on both (a) a probability of

each component that the component needs to be repaired and (b) the costs of those components (col. 11, lines 3-10). The method of Felke produces a ranked list of repair actions, such as component replacements, and an <u>average</u> cost if these components were replaced in the order ranked that is a best case or minimum <u>average</u> cost to repair the aircraft (col. 12, lines 1-7). Any introduction of individual repair cost adjustments into the ranking algorithm of Felke would change its principle of minimizing an average cost for a repair.

Additionally, it is stated in the Office Action that an artisan of ordinary skill, when performing a maintenance action on a mechanical system, would recognize an opportunity to perform another repair if the situation accommodates that repair. Applicant respectfully submits that the construction, repair and/or maintenance of aerospace systems are highly complex processes. The design, construction and maintenance of an aerospace system represent the pooling of knowledge of many people. An aerospace system such as the Space Shuttle can be serviced by groups of people in several different locations. An artisan of ordinary skill working on an aerospace system is not likely to be in a position to spontaneously recognize an opportunity to perform a repair. Such an artisan would be highly unlikely to perform operations on such a system except in accordance with highly regulated and documented procedures (Felke, col. 1, lines 21-31). Applicant respectfully submits that in view of the scale, complexity and regulatory control of aerospace systems, the *process* of replacing a water pump and belts in an automobile engine as described by Thogard would not be analogous to the *processes* of manufacturing, maintaining or servicing of an aerospace system.

Applicant submits that neither Felke, Gadh, nor Thogard, alone or in combination, teach or suggest the recitations of claim 25. Applicant respectfully submits that claim 25, and claims 26-32 dependent on claim 25, should be allowed.

Claim 32 is amended to recite a processor and memory configured "...to display a list of operations performable after the selected operation without incurring cost beyond any cost of the operations performable after the selected operation." Neither Felke nor Gadh, alone or together, teach or suggest the recitations of claim 32 as amended. Further, it is admitted in the Office Action that "Felke does not expressly disclose, *to represent each process as a set of sequential operations.*" Applicant respectfully submits that claim 32 as amended should be allowed.

With reference to independent claims 33 and 38, it is admitted in the Office Action (with reference to claim 32) that "Felke does not expressly disclose, *to represent each process as a set of sequential operations.*" Further, as previously discussed with reference to claim 25, neither Felke nor Gadh teach or suggest determining duplicate operations. Accordingly, neither Felke, Gadh, nor Thogard, alone or in combination, teach or suggest "...receiving from a user a selection of one of the operations of a first of the processes; determining whether the selected operation is performable as part of a second of the processes; and based on the determining, notifying the user as to a feasibility of combining performances of the first and second processes" as recited in claim 33. As to claim 38, neither Felke, Gadh, nor Thogard, alone or in combination, teach or suggest "...receiving from a user a selection of one of the operations of a first of the processes; determining whether the first process is a first sub-process of a second process, and whether the selected operation is duplicated in a second sub-

process of the second process; and based on the determining, notifying the user as to a feasibility of combining performances of the sub-processes" as recited in claim 38. Applicant respectfully submits that claims 33 and 38, and claims 34-37 and 39-44 respectively dependent on claims 33 and 38, should be allowed.

As to dependent claims 31 and 44, the claims are amended to recite that "the plurality of processes are performed at a plurality of aerospace work and/or test station locations between which at least part of the aerospace system is moved ..." Amended claim 31 further recites "...the processor and memory configured to identify one or more of the station locations for performing the selected operation." Amended claim 44 further recites "...identifying one or more of the station locations for performing the selected operation." Neither Felke nor Gadh, alone or in combination, teach or suggest the recitations of claims 31 and 44 as amended.

Additionally, claims 27 (dependent on claim 25) and claim 40 (dependent on claim 38) are amended. For example, amended claim 40 recites "...determining whether an operation is a mandatory operation performable downstream of the selected operation or a permissive operation that need not be performed; and based on the determining, notifying the user as to costs associated with the mandatory operation." Felke discloses *possible* tests (Fig. 3, item 313 and descriptive text) and *possible* repairs or operations, which could change after testing (col. 20, lines 28-67). Neither Felke nor Gadh teach or suggest distinguishing between mandatory and permissive operations or notifying a user as to costs associated with a mandatory operation. Applicant respectfully submits that claims 27 and 40 should be allowed.

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action and the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (314) 726-7521.

Respectfully submitted,

Dated: April 18, 2008
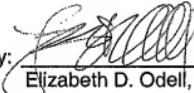
By: _____
Elizabeth D. Odell, Reg. No. 39,532

HARNESS, DICKEY & PIERCE, P.L.C.
P.O. Box 828
Bloomfield Hills, Michigan 48303
(248) 641-1600

EDO/nr